

Evidence 2

A solid wall of vermiculite concrete

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Disclosure of the invention

This invention relates to a solid wall of vermiculite concrete, composed by an upper and bottom immovable slot of lightweight steel, a standing cylinder of a lightweight steel frame, vermiculite concrete, fiber reinforced concrete sheets, and a separating net, wherein the separating net can be replaced by another fiber reinforced concrete sheets so as to achieve the half-drought, half humidity, non-load-bearing wall having the multi-purposes characteristic in lightweight, strike-endurance, fire prevention and soundproof.

The conventional non-load-bearing wall, such as pipeline wall, outer wall and indoor blocked wall, are classified as drought blocked wall and humidity blocked wall, wherein the drought walls are all hollow wall, such as plaster sheet wall and fire prevention wall, etc, which are formed by fixing the sheets onto the two sides of the frame. Although, this kind of wall has the advantages of lightweight and easy movement, the structure of hollow wall body will cause the body to tend to be damaged as it was struck. For the kind of humidity walls, such as brick wall and concrete wall, those are formed by fixing several kinds of separating nets onto the frames, then by painting the concrete on the surface thereof, wherein there are so many kinds of separating nets, and the mesh is small and directive. The painting construction can be implemented on the surface of the mesh, but the surface of the wall tends to be cracked. The inventor of this application represents a new solid wall of vermiculite concrete by remove the drawbacks of the above-mentioned prior arts. This application is a form of half-drought and half-humidity, which concludes the advantages of conventional drought and humidity wall and excludes the disadvantages thereof.

Substantially, the solid wall of vermiculite concrete is composed by upper and bottom immovable slot of lightweight steel frame, a standing cylinder of a lightweight steel frame, vermiculite concrete, fiber reinforced concrete sheets, and a separating net, wherein the upper and bottom immovable slot and the standing cylinder of a lightweight steel frame have the "U" shape, and are fixed on the peripheral edge of the wall body with their concaves toward inside. The standing cylinder of lightweight steel frame not only can be built on the two sides of the wall, but also can be vertically built in the wall body in a certain separating distance, depending on the length of the wall for strengthening the wall. The fiber reinforced concrete sheet has a outstanding low water-absorption attribute and is not easy to be soften while wetting

and can keep its characteristic of stress to resist the water's erosion from the filled humidity concrete. The fiber reinforced concrete sheet can be built on the two sides of the frame body which is constructed by the upper and bottom immovable slot and the standing cylinder. The separating nets has the shape of piece-form, wherein the directive mesh of the nets is uniformly distributed therein. The nets can replace the fiber reinforced concrete sheet and be located on one side of the aforementioned frame body. On the top portion of the outer portion of the finished wall body, there is a filling hole for filling the vermiculite concrete thereto, said vermiculite concrete is composed by stirring the vermiculite, concrete and water, thereto. Then, the solid wall of vermiculite concrete is formed. The solid wall of vermiculite concrete, formed by combining the two fiber reinforced concrete and the lightweight steel frame with the lightweight vermiculite filled in, can be used as a general indoor blocked wall. The solid wall of vermiculite concrete, formed by combining the single fiber reinforced concrete sheet, the single separating nets, and the lightweight steel frame with filling the lightweight vermiculite filled in, can be used as a outer wall and pipeline wall. After painted, the outer portion of the separating nets can be used as the double-faces wall for separating the indoor space.

Therefore, the main object of this application is to provide a solid wall of vermiculite concrete, wherein the drought blocked wall which is formed by the two fiber reinforced concrete sheets and lightweight steel frame, is filled with the lightweight vermiculite concrete therein, so as to form a kind of half-drought, half humidity vermiculite concrete solid wall. The solid wall of this application exclude the disadvantage of easy-to-damaged for drought wall( hollow wall) and of the heavyweight and easy-to-crack for humidity wall. The solid wall of this application can be used as a blocked wall for all kinds of buildings. The solid wall of this application is to replace the conventional drought wall and humidity wall so as to enlarge the range of the wall's application.

The other object of this application is to provide a solid wall of vermiculite concrete, wherein the lightweight blocked wall, formed by a single fiber reinforced concrete sheet and a single separating nets, is filled with lightweight vermiculite concrete therein, so as to form the half-sheet, half-net, half-humidity and half-drought vermiculite concrete solid wall. The separating nets, implemented in the single side and inner face of the wall, can be applied as the pipeline wall and outer wall. While constructing, the alternative exchange of the separating nets and the fiber reinforced concrete sheets can be made according to the real necessity, such that the wall can be used as a non-loading-bearing wall for all kinds of building and achieve the purpose of the multi-functionality.

The other object of this application is to provide a solid wall of vermiculite concrete, wherein the solid wall of vermiculite concrete, formed by the single separating nets and the single fiber reinforced concrete sheet, has a solid structure with vermiculite concrete inside. Therefore, the outer surface of the separating nets will not easily crack after painted. Thus, the wall can be used as a general blocked wall with two sides used.

Another object of this application is to provide a solid wall of vermiculite concrete, wherein the vermiculite concrete in the solid wall of the vermiculite concrete is made by stirring the vermiculite, concrete, and water. By the high water absorption characteristic of the vermiculite, the plastic concrete will not exceed outside and phenomenon of water exceeding will not happen.

Another object of this application is to provide a solid wall of vermiculite concrete, wherein the solid wall of vermiculite concrete not only can used as the non-load-bearing wall for all kind of building, but also has the characteristic of lightweight, striking-bearing, fire prevention and soundproof. While applied in the specific place, this application does not need any other peripheral material, so the cost is down.

In order to let the examiner have the more understanding to this application, we have the following description with accompanied with the diagrams and the reference numerals.

Brief description of the drawing:

Fig. 1 is the perspective view of present invention;

Fig.2 is the diagram for the embodiment 1 of the present invention;

Fig.2-1 is the cross sectional of side view for the first embodiment of the present invention;

Fig.3 is the diagram for the embodiment of the present invention;

Fig.3-1 is the cross sectional of side view for the second embodiment of the present invention.

By referring to Fig 1, apparently, the solid wall of vermiculite concrete is formed by upper and bottom immovable slots of lightweight steel frame(1), a standing cylinder of lightweight steel frame(2), fiber reinforced concrete sheets(3) and vermiculite concrete(4), wherein the upper and bottom immovable slots of the lightweight steel frame(1) and the standing cylinder of a lightweight steel frame (2)

all have the "U" shape, and are fixed on the peripheral edge of the wall with their concaves toward inside. The standing cylinder of lightweight steel frame (2) not only can be built on the two faces of the wall, but also can be vertically built between the upper and bottom immovable slots (1) in a certain separated distance, depending on the length of the wall for strengthening the wall. The fiber reinforced concrete sheets (3), which is fixed on the two faces of the frame body that is formed by the upper and bottom immovable slots of lightweight steel frame and the standing cylinder of lightweight steel frame, have a outstanding low water-absorption and is not liable to be soften while wetting and can still keep its characteristic of stress to resist the water's erosion from the filled humidity concrete. The vermiculite concrete (4) is formed by stirring the vermiculite, concrete and water. By the characteristic of the high water absorption of the vermiculite, the plastic concrete will not exceed outside and the phenomenon of water exceeding will not happen. The implementation of this application is to form the hollow drought blocked wall with inner layer built in the middle portion by combining the upper and bottom immovable slots of lightweight steel frame (1), the standing cylinder of lightweight steel frame (2), and the fiber reinforced concrete sheets (3) as described above. The filling hole located in the top portion thereof is used for filling the vermiculite concrete into the hollow inter layer, then the filling hole is to be flatted. After congealed, said solid wall of vermiculite concrete is formed.

The two outer faces of the formed solid wall of the vermiculite concrete is formed by the fiber reinforced concrete sheets (3), which is similar to that of the conventional drought blocked wall. The inner side of the wall is formed by solid layer of the vermiculite concrete (4), which is similar to the humidity blocked wall. Therefore, this wall of this application is an improved half-drought and half-humidity concrete solid wall. By building the fiber reinforced concrete sheets (3) in the two outer faces of the wall, the wall of this application can be used as the indoor load-bearing blocked wall. With respects to the structure of this application, the structure can endure strike more than that of the conventional drought-blocked wall, and this application have the better movable ability and less liable to be cracked than the conventional humidity blocked wall. After implementing and testing, the solid wall of vermiculite concrete of this application has the following advantages:

1. Safety: While constructing, the vermiculite concrete is filled in the drought inter layer formed by the upper and bottom immovable slots of lightweight steel frame, the standing cylinder of lightweight steel frame, and the fiber reinforced concrete sheets. The problem of exceeded fiber and dust-gathering will not happen.

2. Fire-prevention: The two inches of vermiculite concrete in length brings the effect of one hour fire prevention. The two and an half inches of vermiculite concrete in length brings the effect of two hours fire prevention. The four and a quarter inches of vermiculite concrete in length brings the effect of four hours fire prevention. As replacing with the surface material, this application can have a better characteristic of fire prevention.
3. Heat-insulation: The heat transportation coefficient  $K$  of the vermiculite concrete is 0.064 to 0.079. The heat insulation is excellent.
4. Soundproof: When the thickness of the vermiculite concrete is two inches, the STL( Sound Transmission Loss) will be 33dB. And when the length thereof is 2 and half inches, the STL is 40dB. As overlaying with the surface layer material, the effect of soundproof will be more excellent.
5. Striking-Endurance: The strength of the vermiculite concrete against stressing is 225~275Psi( Pound/inch<sup>2</sup>). The striking endurance of the fiber reinforced concrete sheets is 805Kj/m<sup>2</sup>. The ability of striking endurance is excellent.
6. Lightweight: The drought density of the vermiculite concrete is 30~34 Pcf( pound/inch<sup>3</sup>). The specific gravity of the fiber reinforced concrete sheets for the thick of 6mm is 9Kg/m<sup>2</sup>. The specific gravity of the fiber reinforced concrete sheets for the thick of 9mm is 14Kg/m<sup>2</sup>. The specific gravity of the fiber reinforced concrete sheets for the thick of 12mm is 19Kg/m<sup>2</sup>.
7. Anti-mold: The vermiculite concrete and the fiber reinforced concrete sheets are not easy to grow mold.

By referring to the data mentioned above, it is cleared that the solid wall of vermiculite concrete has the function of fire-prevention, striking endurance and soundproof. In other words, this application can be used as an non-load bearing indoor blocked wall for the multi-purposes.

The non-load bearing wall mentioned above not only can be used as the two faces indoors blocked wall, but also can be used as pipeline wall and outer wall. Because the pipeline have one of its faces hanged, the construction thereof is implemented on its single face. While this application is used as the pipeline wall, one side of the fiber reinforced concrete sheets(3) can be replaced by separating nets(5). Because the tiny mesh is located in the separating nets(5), the single side of the mesh can be fixed on the frame by using iron wire so that the form can be replaced for filling the vermiculite concrete. Therefore, the fiber concrete reinforced sheets exploded out of the pipeline does not need the process of painting

and flatten (please refer to Fig. 2-1). So the cost of painting by human labor is saved and the working hours is reduced, and then the construction can be completed more quickly. The half-drought, half-humidity solid wall of vermiculite concrete formed by a single side of fiber reinforced concrete sheets(3) and a single side separating nets(5) has the structural characteristic which is suitable for pipeline wall and the outer wall( please refer to Fig.3). The mesh of the separating nets is directive and tiny, and the vermiculite of the vermiculite concrete (4) has a high water absorption such that the vermiculite concrete (4) is plastic and can prevent the water from flowing vertically, so the process of filling concrete into the outer layer formed by a single side of separating nets(5) and a single fiber reinforced concrete sheet(3) will not make the concrete to exceeded. Then, the outer wall, with the concrete layer(6) toward inside and the fiber reinforced concrete sheets(3) toward outside, is formed by painting the concrete layer(6) on the outer portion of the separating nets(5). And because the solid vermiculite concrete(3) is formed in the space between the separating nets(5) and the fiber reinforced concrete sheets(3), the outer portion of the concrete layer(6) of the separating nets(5) is not liable to crack. So the wall of this application can be applied as the outer wall.

Above all, the solid wall of the vermiculite concrete of this invention is composed by an upper and bottom immovable slot of lightweight steel, a standing cylinder of a lightweight steel frame, vermiculite concrete, fiber reinforced concrete sheets, and a separating nets. The half drought, half humidity solid wall of vermiculite concrete, which is formed by filling the vermiculite concrete into the inner space between the two fiber reinforced concrete sheets, can be used as an indoor blocked wall. The half drought, half humidity, half sheet and half nets solid wall of vermiculite concrete, which is formed by filling the vermiculite concrete into the inner space between one fiber reinforced concrete sheet and one separating nets, can be used as an pipeline wall and outer wall. In other words, this application can be applied as the non-load bearing wall for any kind of building by alternatively applying the single fiber reinforced sheet and the separating nets. The application also has the characteristic of fire-prevention, striking endurance, lightweight, and soundproof. Therefore, this application has met the statutory requirement of a patent according to a patent law. Please the examiner can examine in detail and grant the application a patent.

What is claimed is :

1. A solid wall of vermiculite concrete, at least comprising:

an upper and bottom immovable slot of lightweight steel frame having a shape of "U" and having a length equal to that of wall, wherein a concave of said slot is faced to inner side of the wall as well as is located at top end and bottom end of the wall individually;

a standing cylinder of a lightweight steel frame having also a shape of "U" and having a length equal to that of wall, wherein a concave of said slot is faced to inner side of the wall as well as is located at left end and right end of the wall individually;

fiber reinforced concrete sheets having the same area as that of the wall and located at the two sides of the frame body which is formed by the upper and bottom immovable slot and standing cylinder of lightweight steel frame;

a vermiculite concrete, made of vermiculite and concrete as well as water, filled in the place between the upper and bottom slots of lightweight steel frames and lightweight steel frames standing cylinder as well as the fiber reinforced concrete sheets;

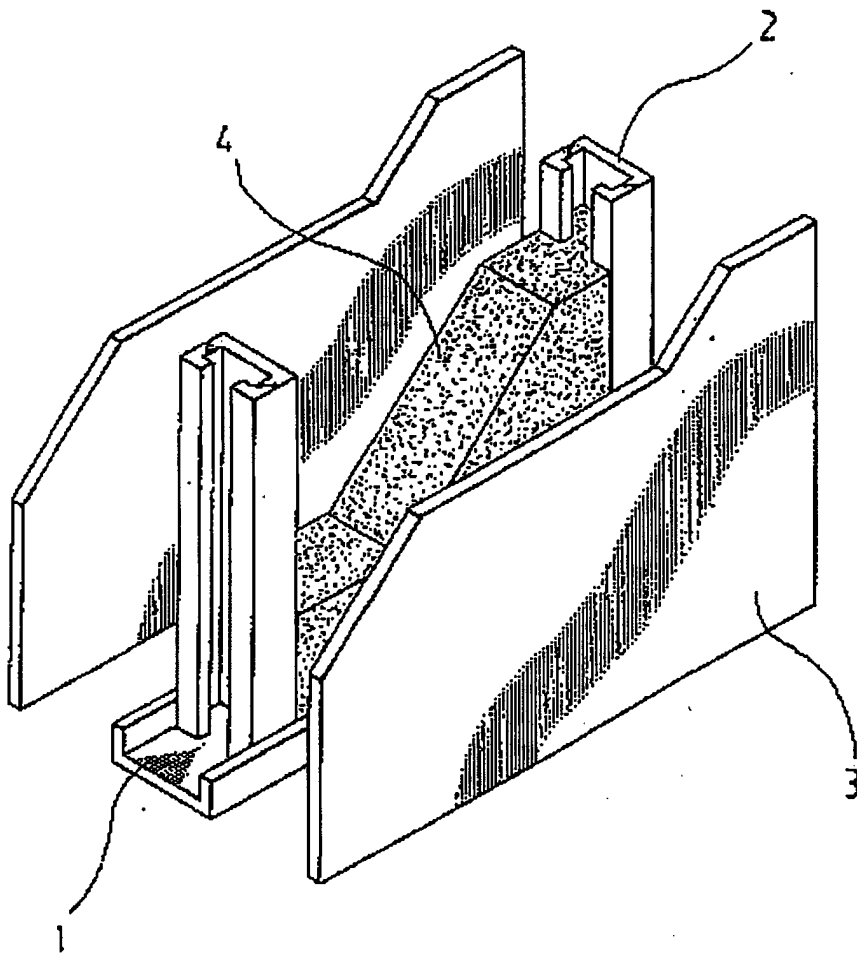
a structure of half-drought, half-humidity vermiculite concrete solid wall composed of the described elements.

2. A solid wall of vermiculite concrete as claimed in Claim 1, wherein said lightweight steel frame stand cylinder is capable of locating at the places which are fixed at the certain length between each other in the wall body.

#### Abstract

This invention is to provide a solid wall of vermiculite concrete, especially, a non-load-bearing which is suitable for every kind of buildings. The wall is composed by: an upper and bottom immovable slot of lightweight steel, a standing cylinder of a lightweight steel frame, fiber reinforced concrete sheets, a separating nets, and a vermiculite concrete, wherein a structure of half-drought, half humidity concrete solid wall, which is formed by filling vermiculite concrete into the space between two fiber reinforced concrete sheets, can be used for general non-load-bearing wall. Moreover, a solid wall structure of half-drought, half-humidity, half-sheet, and half nets vermiculite concrete, which is formed by filling the vermiculite concrete into the space between one side of the fiber reinforced concrete and one side of the separating nets, can be used as a pipeline wall and a outer wall. In other words, by alternating the fiber reinforced concrete sheet and the separated nets in one side of the wall

respectively, the wall can be used as a non-load-bearing wall for every kind of the buildings. Additionally, the wall has the characteristics of fire prevention, soundproof, lightweight, and striking-endurance wall. That is, the wall of this invention has the improvement in its multi-purposes.



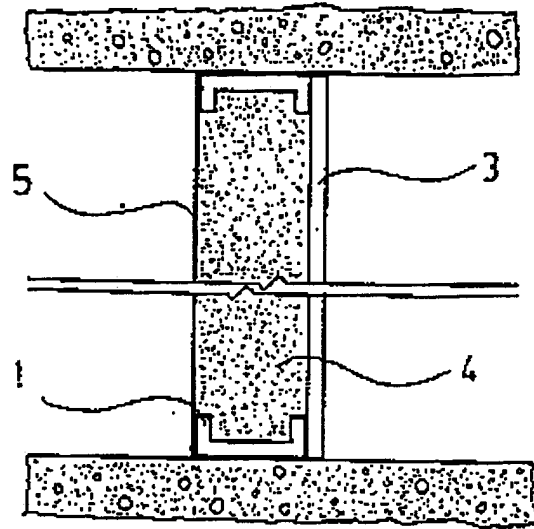


图 1

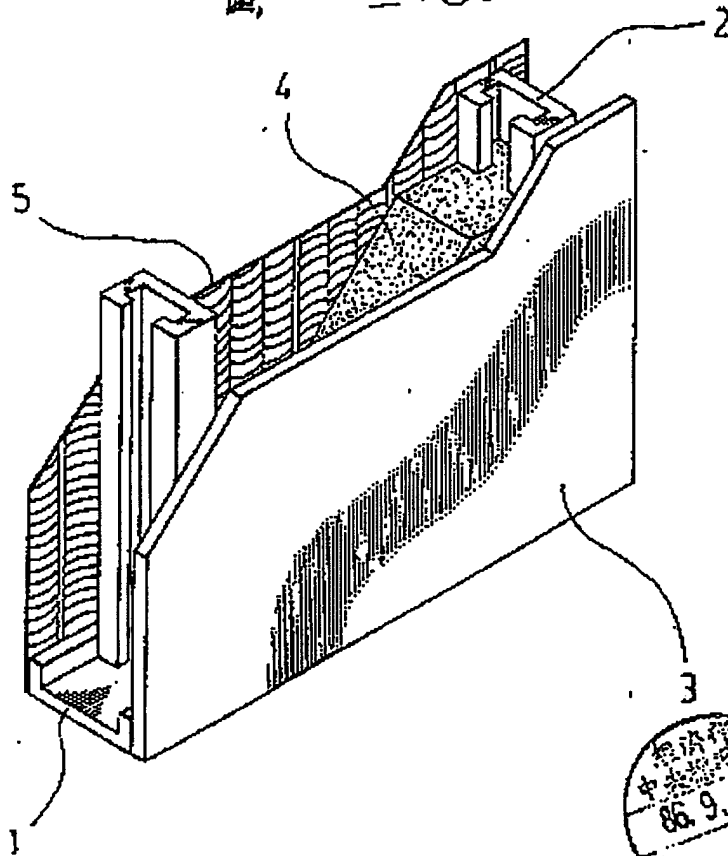


图 2



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